REMARKS/ARGUMENTS

In paragraph 3 on page 1 of the Official Action, claims 1-5, 7-8, 10-11, 13-15, 19-30, 32-33, 35-36, 38-40, 44-58, and 62-66 were rejected under 35 U.S.C. 102(e) as being anticipated by Goldstein et al. (Pub. No. US 20020112134). In response, claims 1-7 have been cancelled, claim 8 has been amended to further distinguish Goldstein et al. and re-written in independent form including all of the limitations of its base claim and any intervening claims, claim 9 has been re-written in independent form including all of the limitations of its base claim and any intervening claims, claims 10-15 have been cancelled, claim 16 has been re-written in independent form including all of the limitations of its base claim and any intervening claims, claims 19-32 have been cancelled, claim 33 has been amended to further distinguish Goldstein et al. and re-written in independent form including all of the limitations of its base claim and any intervening claims, claim 34 has been re-written in independent form including all of the limitations of its base claim and any intervening claims, claims 35-40 have been cancelled, claim 41 has been re-written in independent form including all of the limitations of its base claim and any intervening claims, claims 44-53 have been cancelled, claim 54 has been amended to further distinguish Goldstein et al. and re-written in independent form including all of the limitations of its base claim and any intervening claims, claims 55-58 have been cancelled, claim 59 has been re-written in independent form including all of the limitations of its base claim and any intervening claims, and claims 62-66 have been cancelled.

Goldstein teaches that blocks that have change between snapshots are identified in a list, and are copied into backups and stored in offline storage. (Page 2, paragraph [0024].) A first succedent backup 131 (B01) is created by copying from the first state snapshot 113 (S1) all of the data blocks identified in the first succedent snapshot difference list 121. A copy of the snapshot difference list 121 is also included in the first succedent backup 131. (Page 2, paragraph [0030].) Successive precedent backups may be combined into a single precedent backup to reduce offline storage volume and to speed incremental file recovery, as shown in FIG. 10. (Page 4, paragraph [0050].)

Claims 8, 33, and 54 have been amended to further distinguish Goldstein by defining that the sequence of the snapshot copies that is scanned includes the index for the specified older one of the snapshot copies and a respective index for each of a plurality of snapshot copies of the production file system that are both younger than the specified older one snapshot copies and older than the specified younger one of the snapshot copies. Thus, the indices for this particular sequence of the snapshot copies are scanned by a program routine having an outer loop indexing blocks of data in the file system, and an inner loop indexing the snapshot copies in the sequence of the snapshot copies. This is shown in applicants' FIGS. 34 and 35, for example, and described in the applicants' specification on page 63 lines 16-22.

It is respectfully submitted that disclosure in Goldstein pertinent to applicant's claims 8, 33, and 54 is the generation of concatenated precedent lists for example as recited in Goldstein's claim 10 on page 6. The amendment to claims 8, 33, and 54 is intended to more clearly define a scanning procedure including inner and outer loops that determine the blocks that have changed

over a series of at least three successive snapshots. Instead of generating concatenated precedent snapshot difference lists between neighboring snapshots in a series by a process of repeated concatenation (e.g., indexing blocks in an inner loop and indexing snapshot copies in an outer loop), the amended claims define indexing the snapshot copies in an inner loop and indexing blocks in the outer loop.

In paragraph 4 on page 8 of the Official Action, claims 6, 12, 21 and 37 were rejected under 35 U.S.C. 103(a) as being unpatentable over Goldstein et al. in view of Hargrave communication dictionary, Wiley (Copyright 2001). In response, claims 6,12, 21 and 37 have been cancelled.

In paragraph 5 on page 9 of the Official Action, claims 9, 16-18, 34, 41-43, and 59-61 were rejected under 35 U.S.C. 103(a) as being unpatentable over Goldstein in view of Ohran et al. (Pub. No. US 20020112134). Applicants respectfully traverse and respectfully submit that that there is insufficient motivation in the prior art as a whole to combine Goldstein and Ohran in the fashion suggested in the Official Action, and the claimed invention would not result from a proper combination of Goldstein and Ohran.

Goldstein is summarized above. With respect to applicants' claims 9, 16, 41, and 59, pages 9 to 10 of the Official Action say: "Goldstein does not teach 'wherein the snapshot copy facility has a meta bit map for each snapshot copy for indicating blocks of data that are know[n] to be invalid in ..." The Official Action cites Oran for "writing invalid or corrupted data to certain data blocks in the mass storage device (See paragraph [0015] and [Fig 3]) ..."

This appears to be correct since Ohran's paragraph 15 (emphasis added) says:

> [0015] In the event that certain data blocks in the mass storage unit device are lost or become corrupted, the data blocks stored in the preservation memory can be used to incrementally restore or reconstruct a valid set of data without reverting completely back to the data as it exists at time T_0. If, for example, invalid or corrupted data is written to certain data blocks in the mass storage device after time T_0, the original, valid data blocks are stored in a preservation memory as described above. Using the time stamps specifying the chronological sequence in which the data blocks stored in the preservation memory were overwritten in the mass storage device, the data blocks in the preservation memory are written to the current data stored in the mass storage device.

The Official Action further cites Oran for teaching "determining whether there has been a change between the data sets after confirming the valid data block (See paragraph 45)." (Emphasis added). However, this is not found in Ohran's paragraph 45, which essentially says that a roll-back restoration procedure (described in the previous paragraph [0044]) has resulted in valid data:

> [0045] At this point, it is determined that the data 20b (A_1, B, C, D_1, E) represents valid, non-corrupted data. Thus, the data blocks of the preservation memory have been used to incrementally restore in reverse chronological order

the data blocks of the mass storage device until such time that a valid set of data is obtained. It is also noted that the data blocks 20b (A_1, B, C, D_1, E) includes certain data (i.e.$_2$, A_1. and D_1) that would have not been included in the restored data had the data been reverted completely back to the mirrored or backup copy data of T_o. Moreover, this more recent data is restored without requiring a sequence of full mirror or backup operations after T_o .

Page 10 of the Official Action concludes: "It would have been obvious at the time of the invention for one of ordinary skill in the art to have combined the teachings of Goldstein and Ohran, because using the teaches of Ohran would have given those skilled in the art a tool for checking a valid or invalid blocks of data before checking for changes." Applicants respectfully disagree. It is not seen where Ohran teaches checking for valid or invalid blocks of data before checking for changes. Instead, Ohran teaches restoring a set of invalid data blocks by incrementally applying data blocks in a preservation memory in reverse chronological order until such time that a valid set of data is obtained. In other words, given that some blocks in a set have become invalid, Ohran restores the set of blocks by writing "before images" of the blocks in reverse chronological order. This is opposite from the applicants' determining whether a block has changed upon finding that the block is not known to be invalid.

Applicants' claim 9, for example, does not recite restoring invalid data blocks. Instead, claim 9 specifically defines a snapshot copy facility responding to a request for the difference between a specified older snapshot copy and a specified younger snapshot copy. The snapshot

copy facility responds to the request by returning the difference between the specified older one of the snapshot copies and the specified younger one of the snapshot copies. The snapshot copy facility has an index for each snapshot copy for indicating blocks of data that are known to be invalid in said each snapshot copy. The method includes scanning the index for the specified younger one of the snapshot copies, and when the index indicates that a block is not known to be invalid, then determining whether the block has changed between the specified older one of the snapshot copies and the specified younger one of the snapshot copies.

In short, responding to a request for the difference between a specified older snapshot copy and a specified younger snapshot copy by determining whether a block has changed between the specified older snapshot copy and a specified younger snapshot copy when an index indicates that the block is not known to be invalid, should not be confused with restoring potentially corrupted data blocks by incrementally applying "before-images" in reverse chronological order until the data is rolled-back to a valid state.

With respect to applicants' claims 17, 18, 42, 43, 60, and 61, page 10 of the Official Action makes a similar argument with respect to the proposed combination of Goldstein and Ohran. The Official Action says: "Ohran teaching include writing invalid or corrupted data to a certain block. Wherein the abstract states data loss could be caused by data blocks becoming corrupt or lost, therefore data not in use is equivalent to data loss." The applicants respectfully disagree. In the context of Ohran's reconstruction of corrupted data, it is not understood how one can conclude from the abstract of Ohran that data not in use is equivalent to data loss. There is no need to reconstruct data not in use, but there is a need to reconstruct corrupted data.

In view of the above, reconsideration is respectfully requested, and early allowance is earnestly solicited.

Respectfully submitted,

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